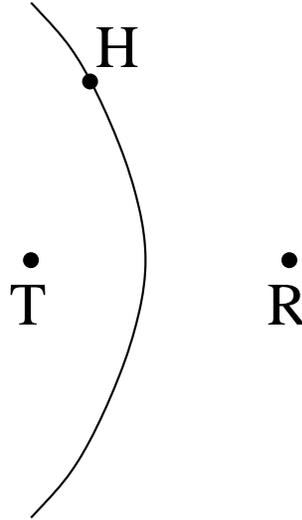


Question

On a level plane the sound of a rifle and that of the bullet striking the target are heard at the same instant. What is the locus of the hearer!

Answer



Consider the wavefront $\begin{cases} \text{if } w = v & \text{locus is the half line } \epsilon T \\ \text{if } w < v & \text{no real locus exists} \end{cases}$

The time taken from the rifle shot to reach H is $\frac{RH}{v}$ where v is the velocity of sound.

The time taken for the sound to reach H via T is $\frac{RT}{W} + \frac{TH}{v} = \frac{RH}{v}$

$$RH - TH = \frac{RT \cdot v}{W} = \text{constant}$$

So the locus of H is a branch of a hyperbola
if $W > v$ (constant = “ $2a$ ” < RT = distance between foci)